





“Subjective vitality of night workers: Association with physical and mental health”

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SUBJECTIVE VITALITY OF NIGHT WORKERS: ASSOCIATION WITH PHYSICAL AND MENTAL HEALTH

Abstract

Night work is one of the most recognized responsibilities of security personnel. Feeling vital is a necessary condition for assuring proper development of this function. Thus, the analysis of its effects on physical and mental conditions is a relevant resource for achieving adequate results at individual and organizational levels. Based on a questionnaire applied to 184 private security guards in Colombia, this study examines the subjective vitality of the personnel working during night shifts and its association with self-perceptions regarding their physical and mental health. Additionally, it analyzes the interference that various demographic variables exert on these relationships. By using partial least squares structural equation modeling, the study found that subjective vitality significantly affects night workers' mental health more than their physical health. That is, subjective vitality among respondents explains 51% of the variability of mental health and 36% of the variability of physical health. A further significant effect of physical health on mental health was also evidenced, in which the former explains the 25% of the latter variability. When comparing results between genders, the study shows that the variability of mental health explained by subjective vitality among women is larger than among men (75% vs. 28%). These results are discussed in light of the theoretical aspects of organizational behavior and are grounded around their potential to address the phenomenon of human resource management in practice. Practical implications include the need for organizational schemes that balance physical and mental health among night workers.

Keywords

subjective vitality, physical health, mental health, night shift work, security guarding, Colombia

JEL Classification

J28, M54

INTRODUCTION

Staying alert means being inquisitive, mentally active, and having the ability to appreciate obvious and hidden patterns in the environment. Someone on alert notices and proactively investigates irregularities and suspicious events. Many individuals in various trades and professions require the ability to actively perform their duties (remain alert) during unconventional working hours, such as night shifts. However, such activities can burden one's mental and physical health due to the frequent interruptions in circadian rhythm, which is motivated by an irregular sleep pattern (Vijaykumar et al., 2018).

Specifically, jobs oriented to the security functions are intended to protect and ensure the integrity and wellbeing of people and assets. Consequently, the adequate fulfillment of responsibilities and the ability to remain in a state of alertness at all times are relevant for people performing these jobs because of their implications on the individual level as well as the collective level of the organizations they work for (Corrales & López, 2016). The nature of guard and



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security jobs negatively affects the vigor to carry out tasks, which is an issue that creates a vicious circle that influences job performance. Indeed, individuals tend to feel less sleepy and more willing to give up their energy when exposed to daylight (Smolders & de Kort, 2014).

This tendency corresponds to a physical and psychological condition associated with self-organization, independence, effort, resilience, and an increase in the quality of life of individuals (Sander et al., 2015). The present study gravitates as a function of this condition and refers to it as a subjective vitality. Specifically, the problem intended to be addressed is based on the eventual link with the health status of the personnel who cover night shifts and of specific conditions for the achievement of this link. Thus, from a perceptual approach, the proposed research question focuses on the association of vitality with the physical and mental health, status of security personnel who work night shifts, and with their demographic characteristics such as age, gender, family conditions, sub-region, and work seniority, that could affect these associations.

Although many jobs and occupations fit the logic outlined above, the present study focused on private security guards. They represent an excellent example of the distribution of work hours and the frequent availability to work night shifts. Regarding the research design, partial use was made of a self-administered instrument (a survey) that measures generic concepts of quality of life-related to the perceived health of a worker in the exercise of their position (Brazier et al., 1992). A cross-sectional inquiry was applied to a sample of 184 security guards who cover night shifts in four sub-regions of the eastern Colombian region. Subsequently, the data were analyzed through partial least squares-structural equation modeling (PLS-SEM).

The results showed that, regardless of the majority of demographic variables measured, the subjective vitality of night workers generated a significantly higher effect on mental health than the effect generated on the respondents' physical health. The phenomenon, however, is even more intense in the reality perceived by women, particularly in the influence exerted on their mental health. These results indicate the importance derived from the perception of vitality in the personnel subject to this type of hourly intensity and suggest the implementation of differentiated administrative practices. Therefore, in addition to the interpretation of what has been observed, the final discussion revolves around how this could generate desired effects on personnel and their working conditions.

1. LITERATURE REVIEW AND HYPOTHESES

Lately, numerous jobs and work activities that operate out of standard daytime work hours have become an increasingly frequent way of employment (Bolino et al., 2021). Protection and security personnel, emergency personnel, and health sector personnel, among others, are part of this particular population. In general, this system exists because of the need for these services to be provided 24 hours a day (Presser, 2009). Similarly, modern technology has modified the production system of goods and services by projecting various activities to be developed in continuous processes, including day and night shifts. Society has also been changing as some countries have understood that this

operating form contributes to the dynamism of their social, productive systems, and economies (Costa, 2001). This also indicates that work will have to be done at unconventional hours to satisfy production and service demands on numerous occasions and under certain conditions.

However, it is necessary to understand that night staff's mental and physical health are under permanent scrutiny due to the alteration of sleep patterns and the effects on individuals in the short, medium, and long term (Hemamalini et al., 2014). There is sufficient empirical evidence that personnel who are regularly subjected to work carried out at night have a notable propensity to suffer deterioration in their health and psyche. For example, continuous performance of night work has been associated with

certain coronary diseases (Knutsson, 2003), severe metabolic disturbances (Wang et al., 2014), propensity to suffer from different types of cancer (Chen et al., 2019), and significant increases in blood pressure levels (Manik et al., 2020). Similarly, evidence has been found linking night work with symptoms of chronic fatigue, insomnia, parasomnia (Gök et al., 2021), high levels of stress (Cannizzaro et al., 2020), and other psychiatric repercussions (Vogel et al., 2012).

According to the Merriam-Webster Dictionary (n.d.), vitality is understood as a lively or energetic quality. However, it also relates to the effectiveness of the vital faculties. Vital individuals tend to have an energetic, active, and determined attitude when thinking, acting, and expressing themselves. Hence, the concept of vitality has both physical and mental implications. Adopting an attitude of vitality is related to dynamism, nerve, strength, drive, transcendence, spirit, and a desire to live in human beings. Conversely, the lack of vitality in people is equivalent to assuming passive, apathetic, and melancholic behavior in daily life.

Although there may be specific, precise measurements related to the vital capacities of an individual in the social and human sciences in the medical field, this concept has been treated almost exclusively as a perception (Deniz & Satici, 2017). For example, Nix et al. (1999) and Ryan and Frederick (1997) defined subjective vitality as the personal experience of being alive, full of vigor, and in a permanent dynamic state. When an individual feels vital, he/she has energy available to himself/herself, reflecting a psychological experience of enthusiasm and inspiration. Now, regardless of the scarce deterministic extents of the construct, it is considered plausible to think that people with a high perception of vitality may be better able to mobilize their internal capacities to avoid pathological processes or to become more actively involved in caring for their health (Agosti et al., 2015).

In the empirical setting of interest for this study, most literature has been focused on reporting overall measurements related to the physical and mental conditions of personnel performing night work jobs (Degenfellner & Schernhammer,

2021). Other contributions have addressed the direct effect that different workload levels can generate on shift workers' emotional regulation (Blanco-Donoso et al., 2015; Bolino et al., 2021; Pallesen et al., 2021; Wöhrmann et al., 2020). Hendriksen et al. (2016), Richman et al. (2009), and Ye et al. (2021) have even attended the generic correspondence between vitality and health. However, there are no significant direct contributions underlining the relationship of night work with the conditions of the vitality of individuals.

Moreover, further studies are focused on understanding the positive role that different actions or conditions provide in improving night workers' outcomes. For instance, it is argued for the positive impact that adequate levels of bright light exert on the emotional perceptions of night staff (Lowden & Kecklund, 2021), particularly concerning their vitality (Kompier et al., 2020). In the same fashion, prescriptive research has demonstrated the beneficial implications of specific therapeutical treatments (Fazeli et al., 2020), and healthy, balanced diets (D'Annibale et al., 2021) with a view of compensating for both physical and mental pressures derived from eventual sleep disorders. Consequently, the present study suggests that the perceived vitality of individuals working during night hours must be set at a high level to experience adequate perceptions of mental and physical health.

Given the above, the aim of the present study is to examine the subjective vitality of the personnel who work during night shifts and its association with self-perceptions regarding their physical and mental health. In this sense, the paper's research questions are: How does subjective vitality correlate with physical and mental health, and how do both health conditions (i.e., physical and mental) correlate? To address them, the following three hypotheses are formulated:

- H1: Subjective vitality of night staff has a positive effect on the perception of their physical health.*
- H2: Subjective vitality of night staff has a positive effect on the perception of their mental health.*

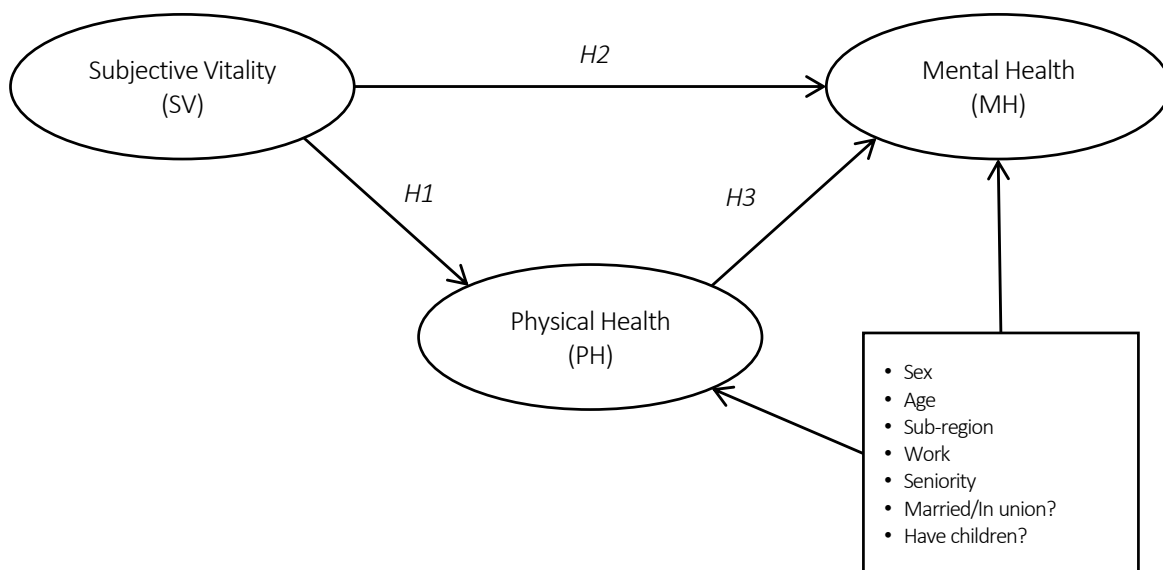


Figure 1. Conceptual model

H3: The perception of the physical health of night staff has a positive effect on the perception of their mental health.

Figure 1 illustrates the conceptual model derived from the hypotheses.

2. METHODS

The present study assumes that the most effective way to understand the phenomenon of interest is through direct surveys of a sample of night workers in the security industry. Therefore, it was decided to approach security guards who meet the condition of working during night shifts. Thus, a survey was administered during the night shift to 184 security guards working at different companies that provide surveillance and private security services in North-Eastern Colombia. The instrument applied was anonymous to protect the identities of respondents.

In addition to demographic issues, the survey included specific items of a standardized instrument intended to measure the different constructs, corresponding to the SF-36 Health Quality of Life Questionnaire (Ware et al., 1993). The categories (i.e., constructs) specifically used in the study were subjective vitality (SV), physical health (PH), and mental health (MH).

Following the indications of Hair et al. (2016), the final sample size of 184 responses is considered acceptable for the present study. This value is larger ten times than the number of items comprising the construct with the highest number of items in the research model. As will be detailed later, this construct for the model examined here corresponds to any of the two endogenous variables PH or MH (with five items, respectively).

The applied questionnaire included items from the SF-36 instrument to measure the three intervening constructs. Thus, subjective vitality was measured using a four-item scale, and both physical health and mental health were measured using two scales with five items, respectively. These particular scales have been extensively used by Brazier et al. (1992), Lin et al. (2020), Lugo et al. (2006). According to Vilagut et al. (2005), despite the subjectivity of these measurements, the validity, reliability, and usefulness of this instrument have been widely evidenced. The SF-36 has been helpful in evaluating perceptual aspects of health in individuals with homogeneous characteristics and the general population. It compares the burden of various ailments and diseases; detects the health benefits produced by a wide range of different intervention methods; and preliminarily assesses the health status of the individuals examined. In this sense, the remarkable

Table 1. Measurement scales and items

Source: Authors' elaboration.

Construct	Item	Summary item content		Arithmetic mean	Adjusted mean	Standard deviation
Subjective Vitality (SV)	SV1	I feel full of vitality	–	4.35	4.35	1.05
	SV2	I have much energy	–	4.22	4.22	1.01
	SV3	I feel exhausted	(RC)	1.77	4.23	0.89
	SV4	I feel tired	(RC)	2.07	3.93	1.06
Physical Health (PH)	PH1	My physical health is excellent	–	4.35	4.35	0.79
	PH2	I get sick more quickly than other people	(RC)	1.80	4.20	1.01
	PH3	I am as healthy as anyone	–	4.14	4.14	1.03
	PH4	I feel like my health is going to get worse	(RC)	1.97	4.03	1.04
	PH5	My health is excellent	–	4.37	4.37	0.95
Mental Health (MH)	MH1	I have been very nervous	(RC)	1.66	4.34	0.87
	MH2	I feel low in spirit	(RC)	1.55	4.45	0.86
	MH3	I feel calm and serene	–	4.23	4.23	0.85
	MH4	I feel discouraged and sad	(RC)	1.58	4.42	0.83
	MH5	I feel happy	–	4.20	4.20	1.11

Note: (RC) – Item treated as a reverse-coded scale.

psychometric properties of SF-36 make it one of the most popular instruments in health-related quality of life studies and in the area of occupational health and safety.

Hence, the instrument used in the present study consisted of 14 items (see Table 1). Each item was interpreted through a five-level Likert scale (some with a negative charge, and therefore treated manually as an inverse code progression for its correct analysis), where 1 corresponded to “strongly disagree,” 2 to “disagree,” 3 to “neither disagree nor agree,” 4 to “agree,” and 5 to “strongly agree.” Additionally, some demographic questions were formulated within the questionnaire, which were tested in the model to verify their eventual intervention on the results: gender (as a dichotomous variable), age (evaluated by four ranges), sub-region (evaluated by four options/sub-regions), and seniority (through six options).

Initial analysis of the sample included data screening and descriptive statistics. Then, a multivariate data analysis procedure, named PLS-SEM, was applied. Worth mentioning, PLS-SEM is a second-order inferential statistical technique suitable for testing correlational hypotheses (Hair et al., 2016). At this stage, the data were analyzed in two synchronized ways. On the one hand, the study evaluates the validity and reliability of scales (i.e., inner model as-

essment). On the other hand, the study examines constructs and the hypothetical research model to test the causal associations of the three formulated hypotheses (i.e., outer model assessment). For this purpose, both the PLS algorithm and a bootstrapping algorithm were undertaken. They were followed by path coefficient inspections (β) and p values (statistical significance) for each effect, as well as the explained variance of each dependent variable (R^2). This technique was selected because PLS-SEM, as a multivariate analytical approach, works efficiently with complex models and does not make assumptions about the underlying data distributions (Lowry & Gaskin, 2014). This analysis was performed using SmartPLS v3.2.8. with 5000 subsamples.

3. RESULTS

The descriptive analysis showed that the average age of respondents was 37.04 years, in a sample composed to a large extent by men (86.96%). Table 2 describes the demographic characteristics of the sample. Additionally, 97.28% of the survey did not present logical inconsistencies in more than a couple of reviewed questions, which suggests that the remaining 2.72% (i.e., five respondents) may be related to problems of understanding the instrument or lack of understanding motivation to answer it correctly.

Table 2. Sample composition – demographic variables (N = 184)

Source: Authors' elaboration.

	Absolute value	Relative value
Gender		
Female	24	13.04%
Male	160	86.96%
Age – mean (SD) = 37.04 (8.72)		
Under 34 years old	68	36.96%
From 34 to 44 years	79	42.93%
From 45 to 55 years old	34	18.48%
Over 55 years old	3	1.63%
Work experience		
Less than 6 months	16	8.70%
From 6 months to 1 year	20	10.87%
From 1 to 3 years	59	32.07%
From 3 to 6 years	41	22.28%
More than 6 years	46	25.00%
No data	2	1.09%
Sub-region		
Santander	93	50.54%
North of Santander	48	26.09%
Arauca	25	13.59%
Cesar	18	9.78%
Married/partnership?		
Yes	109	59.24%
No	75	40.76%
With children?		
Yes	82	44.57%
No	102	55.43%

In general terms, the adjusted mean values of the items were large (above 4.0 in most cases, see Table 1), showing that they tend to be in the best state according to the scales. However, Table 3 shows that the variations within the scales were reasonable because their standard deviations ranged from 0.83 (MH4) to 1.11 (MH5). To evaluate the measurement model, the factor loadings (FL) of the different items of the scales were verified. All of them reached adequate values (all above 0.65), which indicates indicator reliability.

Furthermore, admissible values of Cronbach's alpha (α) and composite reliability (CR; all above 0.75) were obtained for each examined construct. These values account for the internal consistency and, therefore, the instrument's reliability. The values of the average variances extracted (AVE; all above 0.50) confirm convergent validity and the items of the model's constructs represent the variables themselves. In addition, adequate values were obtained in Pearson's determination coefficients ($R^2 > 0.25$), which explains the adequate ef-

iciency of the proposed structural model. Given the above, and by following Lowry and Gaskin's (2014) guidelines, the reliability and strength of the proposed empirical model were confirmed.

Table 3. Assessment of the measurement model

Source: Authors' elaboration.

Construct	Item	FL	α	CR	AVE	R ²
Subjective Vitality (SV)	SV1	0.90	0.79	0.84	0.65	–
	SV2	0.86	–	–	–	–
	SV3	0.79	–	–	–	–
	SV4	0.66	–	–	–	–
Physical Health (PH)	PH1	0.68	0.83	0.86	0.58	0.33
	PH2	0.72	–	–	–	–
	PH3	0.80	–	–	–	–
	PH4	0.79	–	–	–	–
	PH5	0.82	–	–	–	–
Mental Health (MH)	MH1	0.74	0.75	0.79	0.59	0.24
	MH2	0.85	–	–	–	–
	MH3	0.83	–	–	–	–
	MH4	0.75	–	–	–	–
	MH5	0.67	–	–	–	–

As shown in Table 4, the values of the path coefficients (β) and their respective significances (p) support the three formulated hypotheses. Subjective vitality among respondents explains the 51% variability of mental health and 36% variability of physical health. Thus, subjective vitality is positively associated with both the physical and mental health of surveyed individuals. A further significant effect of physical health on mental health was also evidenced, in which the former explains 25% of the latter variability. Hence, the fact that physical and mental health were positively correlated is validated. However, it should be noted that the link between vitality and mental health is stronger and more significant than the link established between vitality and physical health.

Table 4. Hypothesis testing

Source: Authors' elaboration.

Hypothesis	Effect	Path coefficient (β)	p	Result
H1	SV → PH	0.36	*	Supported
H2	SV → MH	0.51	***	Supported
H3	PH → MH	0.25	**	Supported

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Additionally, the analysis finds that age, work seniority, sub-region, marital or union status, and having children were endorsed as control variables

of the study, obtaining non-significant *p-values* ($p > 0.10$) in their intervention on the hypothesized relationships of the model. Interestingly, though in the verification of *H1*, it was possible to control for gender, this variable did exert a particular disturbance in *H2* ($p < 0.10$). This behavior recommends a unique ex-post analysis on this particular hypothesis. Hence, a separate confirmation of the relationship at issue was carried out in both possible results of the variable gender, that is, for men and women. When comparing results between genders, the study shows that the variability of mental health explained by subjective vitality among women is larger than among men (75% vs. 28%). Therefore, the results show that *H2* is tested with greater intensity for women (with a high path coefficient and high statistical significance) as compared to men (Table 5).

Table 5. *H2* verification for both genders

Source: Authors' elaboration.

Evaluated route	Gender	N	β	p	Link
SV → MH	Male	160	0.28	*	Exists
	Female	24	0.75	***	Exists

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

4. DISCUSSION

Typically, the word vitality refers to the perception of feeling alive, with a high level of energy and enthusiasm for what is done. By exploring security personnel behavior, the present work understood this concept as a contrasting idea to tiredness and discouragement in the exercise of night shift work (i.e., a physically and mentally demanding job) (Degenfellner & Schernhammer, 2021). Employing a partial application of the SF-36 instrument on 184 security guards analyzed through a PLS-SEM, the present study finds that the more vital a night shift worker feels, the better his/her self-perceived health is. The study also provides a more nuanced understanding of these associations, considering a more significant impact on their mental health than on their physical health and dissimilarity of responses between respondents' gender.

The results obtained align with previous research in the health and psychological field (Hendriksen et al., 2016; Richman et al., 2009; Ye et al., 2021). However,

as a theoretical contribution, this study reveals a particular approach to analyzing the phenomenon present among night workers, particularly the security personnel. Taking into account the personal and collective implications of executing night-time surveillance and security work on people and assets (Cannizzaro et al., 2020; Chen et al., 2019; Gök et al., 2021; Hemamalini et al., 2014; Knutsson, 2003; Manik et al., 2020; Vogel et al., 2012; Wang et al., 2014), a study of this nature seems relevant for its impact on various bodies of knowledge. The contributions of this study complement the understanding of the behavior of night shift workers in the light of the concept of subjective vitality, understood as the sensation of being alive, full of vigor, and in a permanent dynamic state (Nix et al., 1999; Ryan & Frederick, 1997). The logic presented in the analysis suggests that this perception can generate a certain influence on both physical and mental health status of the individuals involved in the study and, therefore, on their behavior.

Even though subjective vitality can be linked to specific physical signals of individuals, particularly night workers, its effect was observed more firmly on the perception of the status of mental health. The scope of the literature derived from night work studies is based on the circadian chronobiological cycle disorder, which plays a fundamental role in the modulation of human emotions and, therefore, can cause alterations in some functions of the behavior of individuals (Vijaykumar et al., 2018). Not surprisingly, relationships have been established between the molecular mechanisms of circadian rhythms and psychiatric pathologies, such as anxiety, bipolar disorder, depression, hyperactivity, and even schizophrenia (Vogel et al., 2012). Hence, it is suggested that working the night shift makes it necessary, for the perception of the vitality of the individual, to subordinate to this type of schedule to be at adequate levels. This does not only decrease the risk of experiencing symptoms related to mental disorders, but also decrease the risk of unconsciously transforming such disorders into organic and functional symptoms (i.e., somatization).

It was also observed that the reality described has a differentiating nuance between men and women who fulfill this kind of responsibility and work in this kind of schedule. As for the case of women, the observed effect of their subjective vitality on their

own appreciation of their mental health tends to be much more intense and significant than that observed among men. For each whole unit of modification in subjective vitality, the subsequent mental health variation equals 75%. Therefore, it would seem, in principle, that women are more aware of the risks assumed in the exercise of their night work and, therefore, of their own reality. This indicates that self-evaluation of the components measured by the construct of vitality (energy, tiredness, exhaustion, and vitality itself) has to do, in a ratio of 1.00 to 0.75, with elements related to their mental health (such as mood, nerves, or even the feeling of happiness). One of the possible reasons that could explain the above phenomenon lies in the differentiated perception between genders regarding the responsibility of the work and the impact on well-being and/or quality of life.

Regarding the practical contributions derived from the results, it is possible to state that, in the context of night work in security, subjective vitality measurement schemes seem to be necessary to diagnose current situations and predict future behaviors involving night shift workers. The main idea should consist of seeking a balance between their physical and emotional health to create a sense of wellbeing at the workplace and obtain adequate job commitment and performance levels. Therefore, the search for mechanisms that allow increasing the vitality function of night-shift workers should be stimulated. A particular emphasis should be put on women since the assimilation of the variation would have an immediate impact on the perception of their mental health, and ultimately on their actual mental health. However, it must be recognized that despite its susceptibility of being enhanced, vitality is not an individual skill (or a competence) per se.

The present study should also be helpful for practitioners to foresee potential challenges ahead derived from scheduling permanent night shifts in the workplace. Empirical evidence has addressed several im-

plications for workers' health and the convenience of tackling them proactively. The subsequent invitation for human resource managers, specifically for occupational safety and health managers, is to be in line with such inputs to adopt different measures that prevent negative repercussions on the normality of working environments. Actions that look for (and promote) aspects like, inter alia, a proper nutritional diet for night workers (D'Annibale et al., 2021), a proper illumination in their workplace (Kompier et al., 2020; Lowden & Kecklund, 2021), or even the adoption of specific diagnostic and therapeutic procedures (Fazeli et al., 2020), are good examples of what a manager can focus on when designing and implementing organizational schemes oriented to balancing night workers' physical and mental health.

This study has some limitations that must be acknowledged. The results are based on perceptual measures rather than 'diagnosed' certainties or "hard data." Furthermore, the study was conducted on a single industrial sector in Colombia, which precludes absolute generalization of the conclusions of the analysis. Likewise, it is known that the cross-sectional nature of the data collected prevents the statement of causal relationships between the explored constructs. Thus, it is essential to clarify that the obtained results are correlational by nature. These limitations pose future research avenues to be addressed from various theoretical and/or methodological points of view.

Under the current labor market conditions, work night shifts continue to be necessary for day-to-day businesses. Moreover, in recent decades, there has been an enormous growth in the staff population that provides their services at unconventional hours, such as night shifts. This growth has occurred in several sectors, both in developing and developed countries. For this reason, and despite the abovementioned limitations, the contributions derived from this study can be relevant for other industrial sectors and other geographical contexts besides the considered empirical setting in this case.

CONCLUSION

The present study aimed to examine the association between subjective vitality and physical and mental health status of the security personnel in charge of covering night shifts and the demographic conditions that interfere with this relationship. The results obtained indicate that, in general terms, subjective vitality is positively related to fewer adverse physical symptoms and a feeling of better mental health.

The results also show that the effect of subjective vitality on mental health was more significant than that on physical health. These results were achieved regardless of age, sub-region, seniority, marital status, and the responsibility of living with children. However, a significant difference was observed between men and women, indicating that subjective vitality affects their mental health. The study found that this relationship is much stronger and more significant for women than for men.

AUTHOR CONTRIBUTIONS

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